NORTH CAROLINA DEPARTMENT OF HEALTH AND HUMAN SERVICES DIVISION OF PUBLIC HEALTH ENVIRONMENTAL HEALTH SECTION

INNOVATIVE WASTEWATER SYSTEM APPROVAL

Innovative Wastewater Approval Number: IWWS-2012-01

Issued To: Harry Bussey, Jr

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For: Flowtech Wastewater Trench System Bundled Expanded Polystrene Synthetic

Aggregate Units Model FTSG123H-1 OC

Approval Date: May 22, 2012

Pursuant to G.S. 130A-343(g1), ICC Technologies LLC petitioned the Commission for Public Health to have its wastewater trench system, Flowtech Wastewater Trench System (Flowtech), approved as an innovative wastewater system based on ICC's claims that Flowtech is functionally equivalent to an accepted wastewater system, the EZflow by Infiltrator Wastewater Trench System. The Commission found that the petition includes the information required by G.S. 130A-343(g1)(2) and supporting information requested by the Commission. The Commission found that there is clear, convincing and cogent evidence that the Flowtech Wastewater Trench System Model FTSG123H-1 OC is functionally equivalent to the EZflow by Infiltrator Accepted Wastewater Trench System EZ1203H-GEO and satisfies all of the requirements in G.S.130A-343(g1)(1)a - e. Therefore, Flowtech System FTSG123H-1 OC is approved by the Commission as an innovative wastewater system when all of the conditions of this approval are met.

I. Permitting

In order for an approved Flowtech FTSG123H-1 OC trench product to be installed at a previously unpermitted site, an application must be submitted to the local health department for an Improvement Permit or Construction Authorization and the site permitted for the Flowtech product. Prior to the installation of an approved Flowtech FTSG123H-1 OC trench product at a site for which an Improvement Permit or Construction Authorization has been previously issued for a system described in 15A NCAC 18A .1955, .1956, .1957 or .1969 the owner or his authorized agent must notify the local health department in writing and the Improvement Permit or Construction Authorization amended to include the use of the Flowtech product. Permitting and subsequent use of this trench product are contingent upon meeting all the conditions of the approval and applicable rules. Use of this innovative system and any conditions shall be described in the Construction Authorization, as applicable and shall also be described on the Operation Permit to be issued upon the acceptable completion of the system installation.

II. System Description

- A. Minimum pretreatment by septic tank as required in 15A NCAC 18A .1952.
- B. Flowtech expanded polystyrene aggregate particles (EPS) shall meet the following requirements:
 - 1. EPS shall consist of three dimensional rectangular shapes with void channels and surface area protuberances.
 - 2. EPS shall range in size from 0.75 inches to 1.25 inches along any axis.
 - 3. EPS shall have a minimum average particle density of 1.2 pounds per cubic foot, with an allowable lower tolerance per individual sample of 5%. The average particle density shall be determined using a minimum of 6 EPS samples. EPS samples may be collected during the particle manufacturing process or from North Carolina product distributor stock. Such samples shall be taken from particles that were manufactured on a minimum of 3 different production dates, with the production dates spaced a minimum of 7 days apart. Particle density shall be determined using the following formula:

 $PD = BD \div 0.5$, where:

PD = particle density

BD = bulk density, measured in accordance with ASTM C29/C29M-09, with the EPS sampling procedure corresponding to the method set forth in Sections 9 and 12 of the standard

- C. The Flowtech Wastewater Trench System units (also referred to as cylindrical units) shall meet the following general specifications:
 - 1. EPS shall be contained in 180 degrees of high strength netting and 180 degrees of geotextile fabric.
 - 2. The physical and chemical properties of the netting and geotextile fabric shall be durable and resistive enough to retain the shape of the units and to withstand system installation, backfilling, corrosion, and loss of aggregate under intended use.
 - 3. Cylindrical units shall be 12-inches in diameter $\pm -\frac{1}{2}$ inch.
 - 4. Cylindrical units shall be manufactured in 5- and 10-foot long sections, +/- 2 inches.
 - 5. The taper, or reduction in diameter, at each end of the cylindrical units shall not begin more than 3 inches from the point of enclosure, as measured along the linear axis of the unit.
 - 6. Cylindrical units shall be able to withstand an AASHTO H-10 axle load of 16,000 pounds when covered with 12 inches of compacted soil and a shallow cover axle load of 4,000 pounds when covered with 6 inches of compacted soil without collapsing, fracturing or breaking when installed in a trench equaling the product configuration width.
- D. The FTS123GH-1 OC shall meet the following description and specifications:
 - 1. The product shall be comprised of three 12-inch-diameter units 5- or 10-feet long placed side-by-side across the bottom of a 36-inch-wide trench.
 - 2. The outer units shall contain aggregate only, with the netting and geotextile fabric tied off at both ends to prevent the escape of aggregate.
 - 3. The central unit shall contain aggregate and a 4-inch diameter perforated flexible plastic pipe as is typically used in nitrification lines.
 - 4. The pipe shall be certified as complying with ASTM F 405, Standard Specifications for Corrugated Polyethylene (PE) Tubing and Fittings, and shall be in accordance with 15A NCAC 18A .1955(f).
 - 5. The netting and geotextile fabric for the central unit shall be tied off at both ends of the pipe to prevent the escape of aggregate.

- 6. The 4-inch pipe shall be offset from center towards the top of the unit whereby 5 to 6 inches of aggregate is located between the bottom of the pipe and the bottom of the unit, and 1½ to 2½ inches of aggregate is located between the top of the pipe and the top of the unit.
- 7. The three bundles are banded and stretch-wrapped using UV-resistant plastic for packaging and shipping.
- 8. The pipe shall be connected by an internal coupling device to allow continuous connection from one section to the next.
- 9. The end-to-end gap distance between pipe containing cylinders, as measured from the straps fixing the netting and geotextile fabric to the pipe or from the face edges of aggregate on adjoining cylinders, shall be no greater than 3 inches.
- 10. The geotextile fabric shall be sewn to the netting and span 180 degrees along the top of each cylinder. Flanges of the fabric extend up to 1½ inches outwards from the center of the bundle at the attachment point with netting on both sides. The geotextile shall have the minimum average value specifications described in Table I.

Table I - Minimum Geotextile Barrier Material Specifications for FTSG123H-1 OC

| TWOILT THINMAN OUTCOME DWITTER HAWTHAN SPECIAL TO STEEL TO SE | | |
|---|--|--|
| Property | Value | |
| Unit Weight | 2.3 ounces per square yard | |
| Tensile Strength | Cross Direction: 50 lbs Machine Direction: 40 lbs | |
| Air Permeability | 625 cubic feet per minute | |

III. Siting Criteria

Flowtech Wastewater Trench Systems may be utilized on any site that one can use rock aggregate and pipe meeting the following criteria.

- A. Sites which are classified Suitable or Provisionally Suitable for a conventional nitrification field system in accordance with 15A NCAC 18A .1948(a) and (b).
- B. Sites which have been reclassified as Provisionally Suitable in accordance with 15A NCAC 18A .1956(1), (2), (4), (5), and (6).
- C. Sites which meet the criteria for new or existing fill in accordance with 15A NCAC 18A .1957(b). The provisions of Rule .1957(b) are applicable whenever any portion of the aggregate cylinders in a Flowtech Wastewater Trench System extends into fill material. There shall be no reduction in trench length compared to conventional gravel trench. This reference to "fill material" applies to the site fill and not the backfill placed between the trench and the cylinder sidewall.
- D. The required vertical separation shall be measured from the trench bottom.
- E. The maximum trench bottom depth is 36 inches, in accordance with 15A NCAC 18A .1955(g).

IV. Flowtech Wastewater Trench System Sizing

A. The maximum long-term acceptance rate (LTAR) shall be as follows:

Table II

| Textural Group | | LTAR (GPD/ft²) | | |
|----------------|------------------|----------------|-----------|--|
| | | Natural | Saprolite | |
| Soil Group I | Sand | 0.8 - 1.0 | 0.6-0.8 | |
| (Sands) | Loamy Sand | 0.8 - 1.0 | 0.5-0.7 | |
| Soil Group II | Sandy Loam | 0.6 - 0.8 | 0.4-0.6 | |
| (Coarse Loams) | Loam | 0.0 - 0.8 | 0.2-0.4 | |
| Soil Group III | Silt Loam | 0.3 - 0.6 | 0.1-0.3 | |
| (Fine Loams) | Other Fine Loams | 0.5 - 0.0 | NA | |
| Soil Group IV | Clays | 0.1 - 0.4 | NA | |

- B. The LTAR shall be based on the most hydraulically limiting naturally occurring soil horizon within three feet of the ground surface or to a depth of one foot below the trench bottom, whichever is deeper.
- C. To determine the minimum total trench bottom area (ft ²) required, divide the design daily sewage flow by the applicable LTAR shown in Table II above. The minimum linear footage for Flowtech Wastewater Trench System shall be determined by dividing the total trench bottom area by the following equivalency factor:

Table III

| Flowtech Product Configuration | Excavated Trench Width | Equivalency Factor (SF/LF) |
|-----------------------------------|------------------------|----------------------------|
| FTSG123H-1 OC | 36 inches | 4.0 |

^{*}Reduction in nitrification trench length allowed by use of this Equivalency Factor, as compared to sizing requirements delineated in Rule .1955 for conventional systems, apply only to drainfields receiving effluent of domestic strength or better quality. Any proposed use of the system for facilities producing higher strength wastewater shall be sized in adherence with conditions set forth in Rule .1969(m).

Example:

Three bedroom residence with a design daily sewage flow of 360 gallons in a sandy clay loam (Group III) soil

Total computed trench bottom area is:

 $360 \text{ gpd/}0.5 \text{ gpd/square foot (LTAR)} = 720 \text{ ft}^2$

The minimum required linear footage for the Flowtech Wastewater Trench System is:

 $720 \text{ ft}^2/4.0 \text{ ft} = 180 \text{ linear ft.}$

Where 4.0 SF/LF is the equivalency factor for FTSG123H-1 OC

D. The Flowtech Wastewater Trench System may be used in a bed system with the three cylindrical bundles placed in rows side by side. The minimum area (without reduction or equivalency factor) for a bed system shall be determined as required in 15A NCAC 18A. 1955(d).

E. The available space requirements of Rule .1945 shall be met, and this approved innovative system may be designated as the required replacement system.

V. Design and Installation Criteria

A. The Flowtech Wastewater Trench System shall be configured in accordance with Section II, above, installed in excavated trenches constructed with the following minimum center-to-center spacing, trench widths, and soil cover. Dimensional minimums are included for installation and inspection guidance.

Table IV

| Product Configuration | Minimum Trench Spacing on Center (ft) | Trench Width (in) | Minimum Soil Cover ¹ (in) | Minimum Trench Depth (in) | Minimum Pipe Depth Below Grade ² (in) | Pipe Height Above Trench Bottom ² (in) |
|--------------------------|---|-------------------------|--|------------------------------------|--|--|
| FTSG123H-1 OC | 9 | 36 | 6 | 18 | 12 | 5 to 6 |

On sloping lots, minimum required trench depths may be greater.

- B. The FTSG123H-1 OC units are prefabricated with a geotextile backfill barrier attached to the netting. The FTSG123H-1 OC units shall be oriented in the trench with the geotextile covering the top of the system. No additional backfill barrier material shall be required.
- C. The FTSG123H-1 OC units are distributed with four straps wrapped around all three bundles, keeping the bundles together and the "flaps" (flanges of geotextile fabric and netting) oriented in the upward direction. The straps should be kept on for installation and the "flaps" oriented in the upward direction. If the straps are removed, the upward orientation of the "flaps" must be verified by the local health department prior to final cover. The plastic wrap used for packaging and shipping the bundle units shall be removed prior to system installation.
- D. Native soil removed from the trench excavation may be used as backfill. Backfill shall be free of trash or debris. Vehicular traffic and excavation equipment shall not travel over any uncovered drainfield. The latest version of the manufacturer's installation procedures shall be followed.
- E. The Flowtech Wastewater Trench System shall be installed in a level trench in all directions (both across and along the trench bottom) and shall follow the contour of the ground surface elevation (uniform depth), with all continuous adjoining 5- or 10-foot units placed end to end, with the central cylinder distribution pipe interconnected, and without any dams, stepdowns or other water stops.
- F. The 10-foot-long units shall be used to make up the majority of the line length, with the 5-foot units being used only at the distal end of the trench. A maximum of three 5-foot units may be used in any one line length. Examples: A 65-foot trench would utilize six 10-foot units and one 5-foot unit.

² Measurements for pipe height are to the pipe invert or bottom of pipe.

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- G. Flowtech Wastewater Trench Systems installed on sloping sites may use distribution devices or step downs as described in 15A NCAC 18A .1955(j) and (l) when it is necessary to change level nitrification line segments from upper to lower elevations.
- H. Manufacturer's installation instructions for Flowtech Wastewater Trench Systems shall be followed, except as required herein or by 15A NCAC 18A .1900 et. seq.
- I. The system shall be installed by a NCOWCICB certified contractor that is authorized in writing by ICC Technologies, LLC, or its designated representative, for Flowtech Wastewater Trench Systems.

VI. Operation and Maintenance Requirements

The Flowtech Wastewater Trench System shall have a minimum classification as a Type III(g) system (other non-conventional trench systems) in accordance with Table V(a) of Rule 15A NCAC 18A .1961(b).

VII. Repair of Systems

| The provisions of 15A NCAC 18A | A .1961(l) shall govern | the use of the I | Flowtech W | astewater [| Trench |
|------------------------------------|-------------------------|------------------|------------|-------------|--------|
| System for repairs to existing mal | functioning wastewater | r systems. | | | |

| Approved By: | Date: |
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